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09/989,377	11/21/2001	Robert Hofner	Q66255	1293

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EXAMINER

GREY, CHRISTOPHER P

ART UNIT PAPER NUMBER

2667

DATE MAILED: 12/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/989,377	Applicant(s) HOFNER ET AL.	
	Examiner Christopher P. Grey	Art Unit 2667	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 September 2005.
 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-38 is/are pending in the application.
 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
 5) ☐ Claim(s) _____ is/are allowed.
 6) ☒ Claim(s) 1-38 is/are rejected.
 7) ☐ Claim(s) _____ is/are objected to.
 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. Responsive to the amendment filed on September 20, 2005, claims 1,5, 6, 9, 10, 11, 13, 16, 21, 22, 27 and 28 have been amended as requested.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-3, 5-7, 9, 10, 16 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wolff (US 6067545) in view of Peterson (US 5699510)

Claim 1, 9 Wolff discloses a client nodes (Col 4 lines 34-47).

Wolff discloses network resources (Col 4 lines 34-47 and Col 6 lines 6-17 and element 122 in fig 1B).

Wolff discloses a client performing load balancing where a path is remapped to a resource (Col 4 lines 34-60).

Wolff discloses a communication medium connecting a number of servers to a number of clients (Col 5 lines 15-22).

Wolff discloses a remapped path (redundant communication path) between the client and resources (Col 4 lines 49-60).

Wolff does not specifically disclose at least one matching resource.

Peterson et al. discloses two controllers (matching) connected to one another, in which one controller acts as a mirror (redundant resource) to the other (Col 2 line 65-Col 3 line 13)

It would have been obvious to one of the ordinary skill in the art at the time of the invention to modify each resource as disclosed by Wolff to have a matching resource as disclosed by Peterson. The motivation for this modification is to provide a fault tolerant environment (Col 3 lines 4-12).

Claim 2 Wolff discloses a communication medium connecting a number of servers to a number of clients, where the communication medium may be any network type (Col 5 lines 15-22). It would have been obvious to one of the ordinary skill in the art at the time of the invention that any medium may be selected, where a number of possible networks may be implemented as disclosed by Wolff.

Claim 3 Wolff discloses the network being of a network type such as a packet switched local area network (Col 5 lines 15-22). It would have been obvious to one of the ordinary skill in the art at the time of the invention that a switching element is employed within this communication medium.

Claim 5, 6 Wolff discloses resources including any type of memory device, including a file system (Col 4 lines 34-47), where it would have been obvious to one of the ordinary skill in the art at the time of the invention that any memory device can be chosen from the group of memory devices.

Claim 7 Wolff does not specifically disclose the network resource and at least one redundant matching resource being continuously interchangeable.

Peterson discloses two controllers connected to one another, where the memory of each controller is connected, and memory from one memory is duplicated in another (Col 3 line 65- Col 3 line 13).

It would have been obvious to one of the ordinary skill in the art at the time of the invention to modify the teachings of Wolff to allow the interconnection of resources as disclosed by Peterson. The motivation for this modification is to provide a fault tolerant environment (Col 3 lines 4-12).

Claim 10 Wolff discloses an I/O request being received for a particular (assigned) resource (Col 1 lines 56-65).

Wolff discloses a path table for determining a communication path (Col 5 lines 37-58).

Wolff discloses a resource subscriber module for responding to a request, where the response includes resource information including availability (Col 12 lines 50-54), where it would have been obvious to one of the ordinary skill in the art at the time of the invention that resource information may include that determined path.

Claim 16 Wolff discloses an I/O request being received for a particular (assigned) resource (Col 1 lines 56-65).

Wolff discloses assigning a resource (col 6 lines 47- col 7 line 13)

Wolff discloses a path table for determining a communication path (Col 5 lines 37-58).

Wolff does not specifically disclose informing the requestor of the assigned network resources and the assigned communication path.

Peterson discloses a request being sent to a controller, and a response being issued by the controller indicating the granting of the request (Col 4 line 52- Col5 line2).

It would have been obvious to one of the ordinary skill in the art at the time of the invention to combine the determination of the resource and path in the server as disclosed by Wolff, with a response to the client (requestor), where the response includes the determined path and resource. The motivation for this combination is to respond to a request with acknowledgement, resulting in easier detection of a fault.

Claim 22 Wolff discloses software modules for performing a number of functions (Col 8 lines 43-60).

Wolff discloses an I/O request being received for a particular (assigned) resource (Col 1 lines 56-65).

Wolff discloses assigning a resource (col 6 lines47- col 7 line 13)

Wolff discloses a path table for determining a communication path (Col 5 lines 37-58).

Wolff does not specifically disclose informing the requestor of the assigned network resources and the assigned communication path.

Peterson discloses a request being sent to a controller, and a response being issued by the controller indicating the granting of the request (Col 4 line 52- Col5 line2).

It would have been obvious to one of the ordinary skill in the art at the time of the invention to combine the determination of the resource and path in the server as disclosed by Wolff, with a response to the client (requestor), where the response

includes the determined path and resource. The motivation for this combination is to respond to a request with acknowledgement, resulting in easier detection of a fault.

3. Claims 4, 8, 11, 12, 13, 14, 15, 17-20 and 23-26 and 28-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wolff (US 6067545) in view of Peterson et al. (US 5699510) in further view of Richter (US 20020107962)

Claim 4 Wolff discloses the network being of a network type such as a packet switched local area network (Col 5 lines 15-22).

Wolff does not specifically disclose the element being selected from a group consisting of a network switch and a cache control node.

Richter discloses a storage management engine for performing cache processing and data switching (paragraph 0073).

It would have been obvious to one of the ordinary skill in the art at the time of the invention to modify the network as disclosed by Wolff to implement a storage management engine as disclosed by Richter. The motivation for this modification is to allow the network to perform switching and caching functions.

Claim 8 Wolff discloses load balancing among a number of servers (Col 19 lines 51-Col 20 line 8 and Col 6 lines 6-17).

Wolff does not specifically disclose load balancing by concurrently assigning tasks to the network resource and the redundant matching resource.

Richter discloses tasks being assigned to a processor, where a number of processors (elements 13a) exist independently (paragraph 0037), where it would have

been obvious to one of the ordinary skill in the art at the time of the invention that if the processors exist independently, tasks may be assigned or processed simultaneously.

The motivation for this modification is to increase speed and efficiency in performance of a task (paragraph 0037).

Claim 11 Wolff discloses performing load balancing by forming a table comprising information of the resources utilization (Col 25 lines 40-Col 26 line24).

Wolff does not specifically disclose if the number of available resources is larger than one, executing a selection function to determine the at least one network resource to be assigned, and assigning that resource to the requestor, and if the number of available network resources is equal to one, assigning the available resource to the requestor.

Richter discloses a number of load balancing algorithms that may be utilized in order to assign a processing unit to a request. Richter discloses a number of processing units, in which one is selected based on the load balancing algorithm (paragraphs 0175-0177), where it would have been obvious to one of the ordinary skill in the art at the time of the invention that if only one processing unit existed, there would be only one selection.

It would have been obvious to one of the ordinary skill in the art at the time of the invention to modify the use of the utilization information of different resources as disclosed by Wolff, within a load balancing algorithm as disclosed by Richter, in order to make selections based on the utilization. The motivation for this modification is to ensure that resources are fully utilized.

Claim 12, 14, 35, 38 The combined teachings of Wolff and Peterson do not disclose the selection function being selected from a group comprising round robin function, a weighted round robin function, a random function, a least loaded function and a least recently used function.

Richter discloses any load balancing algorithm being used, including a round robin approach, a weighted round robin approach, an approach based on queue depth, or an approach based on some form of feedback from a processing unit, where it would have been obvious to one of the ordinary skill in the art at the time of the invention that any one of these algorithms may be selected depending on a users preference.

Claim 13 Wolff discloses multiple paths to a resource (Col 18 lines 22-49).

Wolff discloses path utilization information, which is used in the event of a re-direct command when a primary path has failed. Wolff discloses redirecting data to a path, which is selected, based on the lowest utilization information (Col 19 lines 51-Col 20 line 8 and Col 25 lines 40-Col 26 line 24).

Wolff does not specifically disclose if the number of available communication paths is larger than one, executing a selection function to determine the at least one communication path to be assigned, and informing the requestor, and if the number of available communication paths is equal to one, assigning the available resource to the requestor.

Richter discloses a number of load balancing algorithms that may be utilized in order to assign a processing unit to a request, where it would have been obvious to one of the ordinary skill in the art at the time of the invention to consider each processing

unit a different communication path. Richter discloses a number of processing units, in which one is selected based on the load balancing algorithm (paragraphs 0175-0177), where it would have been obvious to one of the ordinary skill in the art at the time of the invention that if only one processing unit existed, there would be only one selection.

It would have been obvious to one of the ordinary skill in the art at the time of the invention to modify the use of the utilization information of different paths as disclosed by Wolff, within a load balancing algorithm as disclosed by Richter, in order to make a selection of a path based on the utilization.

Claim 15 Wolff discloses a failover module determining a failure, where when an alternate path exists, an I/O command is reissued and the failed path is marked as failed. (col 18 line49-col 19 line 14).

Wolff does not specifically disclose if no alternate communication path exists, issuing an error notification and a failure of a resource.

Richter discloses reassignment of network resources in the event of a failure to a resource (paragraph 0169).

Richter discloses in the event that a request cannot be processed, notifying a requestor of an error (paragraph 0150).

It would have been obvious to one of the ordinary skill in the art at the time of the invention to modify the failover procedure as disclosed by Wolff, to accommodate for resource failure as disclosed by Wolff, where if no alternate path or resource exists, sending a notification to the given requestor. The motivation for this modification is to implement fault tolerance for both path failure and resource failure.

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Claim 28, 29 Wolff discloses a client nodes (Col 4 lines 34-47).

Wolff discloses the client nodes communicating with resources via a packet switched networks, where the client nodes communicate with nodes within the network in order to communicate with the resources (storage control nodes), where nodes may include routers (switches) as disclosed in Col 4 lines 34-48. Wolff discloses a client node being able to communicate with a resource through an alternate node (Col 14 line 58 – col 15 line 37).

Wolff discloses a memory resource containing a configuration database including a resource database and directory/access table, where it would have been obvious to one of the ordinary skill in the art at the time of the invention that this database performs address resolution.

Wolff discloses performing load balancing by forming a table comprising information of the resources utilization (Col 25 lines 40-Col 26 line 24).

Wolff does not specifically disclose at least two cache control nodes and 2 storage control nodes.

Peterson et al. discloses two controllers (matching) connected to one another, where one controller acts as a mirror (redundant resource) to the other (Col 2 line 65-Col 3 line 13).

Peterson does not specifically disclose a cache control node

Richter discloses a storage management engine for performing cache processing and data switching (paragraph 0073).

It would have been obvious to one of the ordinary skill in the art at the time of the invention to modify the configuration database and load balancing procedures as disclosed by Wolff, to be performed within the storage controller as disclosed by Richter, where there are two controllers as disclosed by Peterson so as to enable fault tolerant environment (Col 3 lines 4-12).

It would have been obvious to one of the ordinary skill in the art at the time of the invention to modify the network as disclosed by Wolff to implement a storage management engine as disclosed by Richter. The motivation for this modification is to allow the network to perform switching and caching functions.

Claim 30, 31, 32 Wolff does not specifically disclose one of the cache nodes being used as a redundant cache control node.

Peterson et al. discloses two controllers (matching) connected to one another, where one controller acts as a mirror (redundant resource) to the other (Col 2 line 65- Col 3 line 13).

Peterson discloses in the event of failure, the second controller providing a seamless failover option (Col 2 line 65- Col 3 line 13).

It would have been obvious to one of the ordinary skill in the art at the time of the invention to modify each resource as disclosed by Wolff to have a matching resource as disclosed by Peterson. The motivation for this modification is to provide a fault tolerant environment (Col 3 lines 4-12).

Claim 33 Wolff does not specifically disclose the cache control node generating a media access control address corresponding to a storage control node.

Richter discloses a network interface engine generating a MAC address dedicated for a processing unit (paragraph 0058).

It would have been obvious to one of the ordinary skill in the art at the time of the invention to modify the combined teachings of Wolff and Peterson, to allow the control unit as disclosed in the rejection of claim 28, to generate a media access control address for identification purposes.

Claim 34 Wolff discloses performing load balancing which chooses a next node to redirect a request to based on a node utilization database (Col 25 lines 21-Col 26 lines23).

Wolff does not specifically disclose the media access control address for specifying the storage control node.

Richter discloses a network interface engine generating a MAC address dedicated for a processing unit (paragraph 0058).

It would have been obvious to one of the ordinary skill in the art at the time of the invention to modify the combined teachings of Wolff and Peterson, to allow the control unit as disclosed in the rejection of claim 28, to generate a media access control address for identification purposes.

Claim 36 Wolff discloses multiple paths from the client to a resource (Col 18 lines 22-49).

Wolff does not specifically disclose a media access control address for specifying a network path to be used.

Richter discloses a network interface engine generating a MAC address dedicated for a processing unit (paragraph 0058).

It would have been obvious to one of the ordinary skill in the art at the time of the invention to modify the combined teachings of Wolff and Peterson to generate a MAC identification as disclosed by Richter, for the specific path chosen as disclosed by Wolff. The motivation for this modification is for identification purposes.

Claim 37 Wolff discloses performing load balancing which chooses a next path to redirect a request to based on a node utilization database (Col 25 lines 21-Col 26 lines23).

Wolff does not specifically disclose the media access control address for specifying the next path.

Richter discloses a network interface engine generating a MAC address dedicated for a processing unit (paragraph 0058).

It would have been obvious to one of the ordinary skill in the art at the time of the invention to modify the combined teachings of Wolff and Peterson, to allow the control unit as disclosed in the rejection of claim 28, to generate a media access control address as disclosed by Richter, for the specific path chosen as disclosed by Wolff. The motivation for this modification is for identification purposes.

Claim 17, 23 Wolff discloses performing load balancing by forming a table comprising information of the resources utilization (Col 25 lines 40-Col 26 line24).

Wolff does not specifically disclose if the number of available resources is larger than one, executing a selection function to determine the at least one network resource

to be assigned, and assigning that resource to the requestor, and if the number of available network resources is equal to one, assigning the available resource to the requestor.

Richter discloses a number of load balancing algorithms that may be utilized in order to assign a processing unit to a request. Richter discloses a number of processing units, in which one is selected based on the load balancing algorithm (paragraphs 0175-0177), where it would have been obvious to one of the ordinary skill in the art at the time of the invention that if only one processing unit existed, there would be only one selection.

It would have been obvious to one of the ordinary skill in the art at the time of the invention to modify the use of the utilization information of different resources as disclosed by Wolff, within a load balancing algorithm as disclosed by Richter, in order to make selections based on the utilization. The motivation for this modification is to ensure that resources are fully utilized.

Claim 18, 20, 24, 26 Wolff does not disclose the selection function being selected from a group comprising round robin function, a weighted round robin function, a random function, a least loaded function and a least recently used function.

Richter discloses any load balancing algorithm being used, including a round robin approach, a weighted round robin approach, an approach based on queue depth, or an approach based on some form of feedback from a processing unit, where it would have been obvious to one of the ordinary skill in the art at the time of the invention that any one of these algorithms may be selected depending on a users preference.

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Claim 19, 25 Wolff discloses multiple paths to a resource (Col 18 lines 22-49).

Wolff discloses path utilization information, which is used in the event of a re-direct command when a primary path has failed. Wolff discloses redirecting data to a path, which is selected, based on the lowest utilization information (Col 19 lines 51-Col 20 line 8 and Col 25 lines 40-Col 26 line 24).

Wolff does not specifically disclose if the number of available communication paths is larger than one, executing a selection function to determine the at least one communication path to be assigned, and informing the requestor, and if the number of available communication paths is equal to one, assigning the available resource to the requestor.

Richter discloses a number of load balancing algorithms that may be utilized in order to assign a processing unit to a request, where it would have been obvious to one of the ordinary skill in the art at the time of the invention to consider each processing unit a different communication path. Richter discloses a number of processing units, in which one is selected based on the load balancing algorithm (paragraphs 0175-0177), where it would have been obvious to one of the ordinary skill in the art at the time of the invention that if only one processing unit existed, there would be only one selection. It would have been obvious to one of the ordinary skill in the art at the time of the invention to modify the use of the utilization information of different paths as disclosed by Wolff, within a load balancing algorithm as disclosed by Richter, in order to make a selection of a path based on the utilization.

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4. Claims 21 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wolff (US 6067545) in view of Richter (US 20020107962)

Claim 21, 27 Wolff discloses a failover module (software) determining a failure, where when an alternate path exists, an I/O command is reissued and the failed path is marked as failed (col 18 line49-col 19 line 14).

Wolff does not specifically disclose if no alternate communication path exists, issuing an error notification and a failure of a resource.

Richter discloses reassignment of network resources in the event of a failure to a resource (paragraph 0169).

Richter discloses in the event that a request cannot be processed, notifying a requestor of an error (paragraph 0150).

It would have been obvious to one of the ordinary skill in the art at the time of the invention to modify the failover procedure as disclosed by Wolff, to accommodate for resource failure as disclosed by Wolff, where if no alternate path or resource exists, sending a notification to the given requestor. The motivation for this modification is to implement fault tolerance for both path failure and resource failure.

Response to Arguments

5. Applicant's arguments filed on September 20, 2005 have been fully considered but they are not persuasive.

(a) The applicant argued that the cited art does not disclose the applicants claimed, "load balancing between tasks given to a network resource and tasks given to its redundant network resource."

The examiner maintains that the same limitation in its broadest term is already discussed within the rejection of claims 1, wherein Wolff discloses load balancing between two servers within a network (Col 2 lines 37-64 and Col 5 lines 23-36)). Wolff discloses within fig 1A two utilization servers 104A and 106A, where for a client 102A, server 104 A acts as the primary resource, and 106A acts as a redundant resource (see fig 1A). Wolff discloses I/O requests (tasks) as disclosed in Col 6 lines 5-17.

The examiner makes notes that the applicant argues that Peterson discloses redundancy and that two mirrors are duplicate, thus balanced. The examiner further notes that is the two mirrors are balanced, taken in its broadest interpretation, the loads on both mirrors are balanced.

(b) The applicant argued that the cited art does not disclose the applicants claimed, "redundant communication path are independent from the communication medium".

The examiner maintains that the same limitation in its broadest term has already been discussed within the rejection of claim 1, wherein Wolff discloses a redundant communication path (element 76 in fig 1A) different from the communication path via

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the resource (element 74 in fig 1A). In response to the applicants argument that the cited art does not disclose an alternate path to avoid a network failure, the examiner maintains the previous stance by highlighting that Wolff discloses an alternative path being mapped intelligently based on an overall utilization and path table (Col 5 lines 37-58).

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

(a) Wisner et al. (US 20020163910) discloses a method for accessing resources, where a switch and controller are used to route information to and between two resources, and where the second resource acts as a standby resource in the event of failure of the first resource.

(b) Blumenau et al. (US 6295575) discloses a cached storage node for accessing storage units with the use of directory services, accessing addresses.

7. THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

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8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher P. Grey whose telephone number is (571)272-3160. The examiner can normally be reached on 6:30-3:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chi Pham can be reached on (571)272-3179. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Christopher Grey
Examiner
Art Unit 2667

C. Grey
12/9/05

Chi Pham
CHI PHAM
SUPERVISORY PATENT EXAMINER
12/12/05